



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
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OPNAVINST 9094.1C
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OPNAV INSTRUCTION 9094.1C

From: Chief of Naval Operations

Subj: FULL POWER AND ECONOMY TRIAL REQUIREMENTS FOR NON-NUCLEAR
SURFACE SHIP CLASSES

Ref: (a) NAVSEA Technical Manual S9541-BH-HBK-010 (NOTAL)
(b) FXP-4 Mobility (MOB) Exercise (NOTAL)
(c) NAVSEA SL101-AA-GYD-010, Energy Conservation (NOTAL)
(d) NAVSEAINST 9094.5
(e) NAVSEA Technical Manual S9086-C4-STM-000,
Chapter 094 (NOTAL)
(f) NAVSEA 0900-LP-095-3010 (NOTAL)

1. Purpose

a. To provide full power and economy trial requirements for in-service non-nuclear surface ships and to delineate reporting procedures for updating trial requirements per references (a) through (c).

b. To establish policy on performance and special trials for new ship classes as required by the latest version of references (d) through (f). Performance data from these trials shall be used to add requirements for new ship classes and revise, wherever required, existing ship class requirements contained in reference (a).

2. Cancellation. OPNAVINST 9094.1B.

3. Applicability

a. The full power and economy trials requirements of this instruction shall apply to non-nuclear surface ships (excluding boats and craft).

b. The performance and special trials requirements of this instruction shall apply to each ship class and is performed on only one ship (preferably the lead ship). These requirements

shall also apply to existing ship classes that have undergone major modifications as determined by Commander, Naval Sea Systems Command (COMNAVSEASYS COM) Naval Systems Engineering Directorate (NAVSEA 05).

4. Discussion. Reference (b) delineates general requirements for conducting engineering trials. Full power and economy trial requirements are based partially on calculations and partially on design requirements since it is not economically feasible to conduct full-scale trials to support every possible operating condition. Therefore, there is a need to maintain a reporting system for engineering trial results to validate and update engineering trial requirements. Reference (a) tabulates full power and economy trial requirements based on calculations, design requirements, and actual standardization trial results, as required by reference (d). The full power trial requirement for all non-nuclear surface ships is based on developing 95 percent of the design rated full power shaft horsepower (SHP).

a. Full power trial measurement for those ships without torsion meters installed is based on propeller revolutions per minute (RPM) related to 95 percent of design full power. Reference (a), enclosures (1) through (4), provide the requirements and allowances for various other factors such as displacement, ship's age, seawater injection temperature, time out-of-dock, and fuel temperature, which further correct the actual propeller RPM required to demonstrate full power.

b. Full power trial measurement for those ships provided with installed torsion meters is based on a direct reading of the SHP (95 percent of design full power.)

c. Reference (a), enclosure (5), provides sample computations for establishing full power requirements for various ship classes.

d. Performance and special trials are normally conducted on a lead ship of a new class after delivery, but prior to obligated work limiting date, as outlined in detail, in references (d) through (f). These trials generally include: standardization (speed-power) and fuel economy; machinery performance; maneuvering (circles, zig-zags, horizontal overshoots, spirals, lateral stability, and low speed

controllability); hydrodynamic and structural performance; and hull and propulsion plant vibration trials. For a particular ship class, specific performance and special trials requirements shall be obtained from NAVSEA 05 Marine Engineering (SEA 05Z), per reference (d). Data obtained from these trials shall be used to update reference (a). This data is regularly requested from NAVSEA 05 and used by the Office of the Chief of Naval Operations (OPNAV), United States Fleet Forces Command, Commander, U.S. Pacific Fleet, type commanders (TYCOMs), immediate superiors in command, and ship's operators, as well as the naval planners and ship designers.

5. Policy

a. Full power trials shall be conducted for a minimum duration of 1 hour and at a minimum depth of water as prescribed by reference (e). As directed by the observing senior engineer, extended full power demonstration may be required because of observed dynamic changes in plant performance or stability. All full power trials shall be conducted with a 75 percent minimum liquid load (including bulk cargo tanks) at the commencement of the trial. Fleet commanders and TYCOMs shall determine when to conduct full power trials and shall ensure machinery alignments during full power trials follow design heat balance diagrams, propulsion operating guides.

b. Fleet commanders and TYCOMs shall determine when to conduct economy trials and shall ensure machinery alignments during economy trials conform to propulsion operating guides and reference (c).

c. Full power and economy trials may be conducted in conjunction with engineering trials conducted for competitive exercises, or during Board of Inspection and Survey underway material inspections on in-service ships. Full power and economy trials shall not be conducted in conjunction with builders trials, acceptance trials, or final contract trials, governed by contract specifications, or pre- and post-overhaul trials. The requirements and factors delineated in reference (a) are applicable to full power and economy trials.

d. Performance and special trials shall be conducted once on one ship of a new ship class (or significantly different

follow-on ship of an existing class) as outlined in reference (d) to provide the complete performance data and information required.

e. Trials shall be considered satisfactory when conducted per this instruction and all requirements stated in references (d) through (f).

6. Responsibilities

a. COMNAVSEASYSCOM (SEA 05Z) shall coordinate performance and special trials per references (d) through (f).

b. Fleet commanders and TYCOMs shall direct full power and economy trials requirements using references (a) and (b) as the basis.

7. Forms and Reports

a. Reports of all satisfactory and unsatisfactory full power and economy trials shall be provided to COMNAVSEASYSCOM (SEA 05Z). The report of an unsatisfactory trial is particularly important because it can be used to provide information on design or materiel problems that preclude a successful trial.

b. Reports shall be completed using the applicable OPNAV 9094 series forms. Completed reports are assigned report control symbol OPNAV 9094-1 and are approved for 3 years from the date of this instruction.

c. The following forms are available for download or purchase on Naval Forms OnLine
<https://navalforms.documentservices.dla.mil/web/public/home>:

(1) OPNAV 9094/1A Engineering Trial Report Letter

(2) OPNAV 9094/1B Engineering Trial Report - Trial Data
(Steam Turbine Driven Ships with Oil Fired Boilers)

(a) Sheet 1

(b) Sheet 2A S/N 0107-LF-090-9415

(c) Sheet 2B S/N 0107-LF-090-9420

(d) Sheet 3 S/N 0107-LF-090-9425

(3) OPNAV 9094/1C Engineering Trial Report - Trial Data
(Diesel Driven Ships)

(a) Sheet 1

(b) Sheet 2 S/N 0107-LF-090-9435

(4) OPNAV 9094/1D (5/79) Engineering Trial Report -
Trial Data (Gas Turbine Driven Ships)

(a) Sheet 1

(b) Sheet 2 S/N 0107-LF-090-9445

d. Reports for ship performance and special trials shall be prepared and distributed per references (d) through (f).

8. Records Management. Records created as a result of this instruction, regardless of media and format, shall be managed per Secretary of the Navy Manual 5210.1 of January 2012.



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